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Citrus Industry of Turkey

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Foreword

In the fall of 1963, Turkey and the European Economic Community signed an agreement leading to Turkey's association with the Community. Since citrus production in Turkey has been going up in the past several years, the Foreign Agricultural Service made a survey in the major producing areas to determine what effect on international citrus trade the association would be likely to have.

This is a report of the on-the-spot survey, intended as an aid to the U. S. citrus industry in evaluating the potentials and problems of the Turkish citrus industry, and competition which Turkish citrus and citrus products may present in international markets.

J W Stewart

J. W. Stewart, Director
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Citrus Industry of Turkey

BY: J. HENRY BURKE, FRUIT AND VEGETABLE DIVISION

Turkey, like other countries of the Mediterranean area, has been growing citrus for a long time, nearly all of it for domestic consumption. In the past 15 years, production has increased sharply, but the industry has a long way to go before it will be a serious competitor in international citrus markets.

Citrus production is centered in Mediterranean provinces, fragmented into many widely separated coastal producing areas. Only in the Mersin-Adana area are citrus plantings fairly concentrated. This dispersion of production is a handicap to development of fruit exports.

In 1964, Turkish citrus plantings were approximately: Oranges, 65,000 acres; tangerines, 16,000; lemons, 11,000; grapefruit, 500. By 1970, this total of about 92,500 acres may have increased—as the result of new plantings—about one-fifth, to 110,000 acres.

As new plantings come into bearing, sharp rises could bring 1970 levels of citrus production to 15.5 million boxes, and 1980 levels to 20 million boxes. However, not more than 25 percent of production in 1970 is expected to be of export quality as fresh fruit.

All Mediterranean districts are irrigated, and all citrus areas have some degree of frost hazard. Groves, usually 2 to 3 acres in size, are cultivated in most cases by hand; labor costs less than $1 a day. There is great variation in quality of fruit produced.

Nearly all citrus is now consumed in the domestic market, and a combination of rising citrus production, better roads and increased purchasing power has caused per capita consumption to rise from a 1948 level of about 5 pounds of oranges and tangerines, and 1½ pounds of lemons, to the 1960 level of about 19 pounds of oranges and 4 pounds of lemons. Nearly all oranges and tangerines are consumed in the 6-month period, November to May. However, full-wrap packs of lemons are stored in caves for domestic use throughout the summer. As many as half-a-million 48-pound boxes of these "sleeping lemons" are stored each year.

In the 15-year period, 1948-62, both orange and lemon exports have increased sharply, in the case of oranges from 22,000 boxes to nearly one-half million, in that of lemons from 2,000 boxes to over 300,000 (the latter representing as much as 20 percent of production in recent seasons). However, sustained exports as high as 500,000 boxes each of oranges and lemons, will probably not be achieved for some time.

To date, Eastern European and Middle Eastern markets have taken most of the orange exports with Germany receiving about half the lemons and Eastern European markets—such as Czechoslovakia, Bulgaria, and Poland—most of the rest, with the United Kingdom, Austria, and the Netherlands small outlets.

Turkey has no seasonal advantage over competitors, as both oranges and lemons are sold at the peak of Mediterranean supplies. The hot summers of the Mersin-Antalya area result in a one-crop lemon industry. Lack of a summer crop, and the large size of Turkish lemons, are export-limiting factors.

In Western European auction markets, Turkish oranges sell at a discount compared with Israeli fruit. Turkish lemons bring prices about equal to other Mediterranean lemons, and somewhat less than those for Arizona and California fruit. Turkish grapefruit may create new competition for U. S. winter grapefruit exports, with Turkish lemons only limited competition, November through January.

Turkey has no summer citrus for export.

As recently as 1963, no citrus was processed in Turkey. Processing, as in other Mediterranean districts, will be a low-return salvage operation which may be developed when supplies and marketing refinements make product fruit available.

Turkey's association with the European Economic Community (EEC) will probably have little effect on directing citrus or citrus products to Western markets. Problems of season, fruit quality, and size would seem to be of overriding importance.

Turkey has a small domestic industry "growing up," and it will take some time before the discipline of export production and trade results in any large quantity of citrus supplies for international trade.

Acreage and production

Acreage

Citrus is an ancient crop in Turkey, but as in other Mediterranean areas, plantings have increased rapidly since 1950. Major orange and lemon areas are in Mediterranean provinces. Most lemons are produced in the provinces of Antalya and Icel (Mersin area), most oranges in the provinces of Icel (Mersin area), Hatay (Iskenderun), Antalya, and Adana.

Total plantings in 1960 of 5.5 million orange trees, 1.4 million tangerines, and 850,000 lemon trees indicate a probable 1960 acreage of about 60,000 acres of oranges, 15,000 of tangerines, 10,000 of lemons.

Taking continuing plantings into account, the citrus area by 1964 had probably increased to 65,000 acres of oranges, 16,000 acres of tangerines, 11,000 acres of lemons, and 500 acres of grapefruit. Of this total, the author's field observations—based on location of groves, varieties planted and fruit quality—indicate that Turkey in 1964 probably had about 4,000 acres of oranges, 1,000 acres of tangerines, and 5,000 acres of lemons capable of producing fruit of such quality that it could be exported to western European markets.

Plantings continue to be made in widely scattered areas, so that by 1970 Turkey may have 75,000 acres of oranges, 20,000 acres of tangerines, 15,000 acres of lemons, and 1,000 acres of grapefruit. However, while fruit from the newer plantings may be of improved quality, less than a fourth of Turkey's citrus is likely to be suitable for export by then.

Production

Citrus production has expanded rapidly in the period 1948 to 1964: oranges from 1.3 million to 10 million boxes; tangerines from 65,000 to 1.1 million boxes; and lemons from 350,000 to 1.6 million boxes.

New plantings indicate that production is likely to increase in the immediate future; the 1970 citrus crop could reach 15.5 million boxes of citrus, including 12 million boxes of oranges, 1.5 million boxes of tangerines, and 2 million boxes of lemons. This rapid increase in orange production—which has amounted to 9 million boxes in a 14-year period—has not been enough to satisfy domestic demand. Grapefruit production, though not shown in official statistics, in 1962 was probably about 100,000

Table 1.—TURKISH CITRUS: Number of trees planted by province, 1958 and 1960

Province	1958	1960	1958	1960	1958	1960
	Oranges		Tangerines		Lemons	
	1,000 trees	1,000 trees	1,000 trees	1,000 trees	1,000 trees	1,000 trees
Adana	543	859	30	55	16	18
Antalya	1,080	1,166	136	142	259	281
Artvin [1]	3	3	27	8	—	2
Aydin	149	179	8	16	3	6
Giresun [1]	3	4	17	20	—	—
Hatay (Iskenderun)	1,327	1,337	65	76	42	43
Icel (Mersin)	1,394	1,479	92	87	416	429
Izmir	60	60	105	140	11	12
Mugla	291	341	447	579	44	53
Ordu [1]	6	7	32	45	—	—
Rize [1]	30	32	145	165	4	6
Trabzon [1]	53	25	47	41	5	5
Other	2	4	12	14	2	3
Total	4,941	5,496	1,163	1,388	802	858

[1] Black Sea Provinces.

Official sources.

Table 2.—TURKISH CITRUS: Production and exports, by variety, averages 1948-52 and 1953-57, and annual 1958-64

Year	Production				Exports	
	Oranges [1,2]	Tangerines [1]	Total	Lemons [1]	Oranges & Tangerines	Lemons
	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes
Average:						
1948-52 ----	628	115	1,743	377	39	85
1953-57 ----	3,633	470	4,103	851	105	117
Annual:						
1958 ------	5,090	736	5,826	1,247	282	125
1959 ------	4,806	800	5,606	1,160	402	101
1960 ------	6,669	838	7,537	1,555	278	338
1961 ------	6,648	989	7,637	1,532	81	184
1962 ------	6,998	798	7,796	1,619	375	340
1963 ------	7,040	848	10,683	1,716	159	331
1964 ------	8,923	1,151	10,074	1,571	[3] 189	[3] 435

[1] Shown in boxes of the following weights: Oranges and tangerines 70 pounds; lemons 76 pounds.

[2] Includes between 100,000 and 125,000 boxes of bitter oranges from 1955 to 1961.

[3] Estimated.

Official sources.

boxes; this could increase to 400,000 boxes by 1970.

Official Turkish sources forecast 1970 citrus production at 17 million boxes and 1980 production at 40 million boxes. The author's field observations did not indicate that this 1970 production is likely. Total 1980 citrus production of 20 million boxes would exceed the author's expectations. If citrus production should reach the 1970 level of 12 million boxes of oranges as anticipated, a population of 32 million could consume the whole crop at a consumption level of 25 pounds per person. This seems to indicate most of Turkey's increasing orange production will be consumed in the domestic market during the next 10 years.

Producing areas

Adana

In 1963, the Province of Adana had estimated citrus plantings of about a million sweet orange trees, 150,000 bitter orange, 65,000 tangerine, 26,000 lemon, and 4,000 grapefruit trees. In 1960, Adana produced about 14 percent of Turkey's oranges, 4 percent of its tangerines, and 2 percent of lemons.

In 1963, it was estimated that 80 percent of plantings were of bearing age and only 20 percent not in production. (Field observations indicated that this is a reasonable appraisal of the situation.) Potential of the area for future citrus production is considerable, however, since irrigation is projected here. This planted area was expanding at the rate of about 30,000 trees per year, at which rate, by 1970 sweet orange plantings may have increased to 1.3 million trees.

By fruit type, plantings in 1963 were estimated to consist of about 55 percent local non-blood oranges (Trablus, Alanya and other Belladi types), 15 percent Jaffa (Shamouti), 15 percent Washington navel, 5 percent tangerines, 5 percent Valencia and blood oranges, and 5 percent lemons.

This province is located on the Mediterranean coast on a wide alluvial plain that contains an estimated 500,000 acres. Presence of a high deep mountain range inland assures this area an abundance of water from the Ceyhan and Seyhan rivers. These rivers, when observed in late September 1963, had abundance of water in spite of extensive use in irrigation. (The two main irrigation canals have a capacity of 150 cubic meters of water per second).

A very extensive irrigation project is to be completed sometime between 1970 and 1980, with about 500,000 acres to be either irrigated or drained, or both. In 1963, about 50,000 acres of cotton were being irrigated under this project. By 1965, it was estimated that an additional 13,000 acres would be brought under irrigation.

The valley land lying near the coast contains rather heavy soil, but soils near the rivers and others further inland are light sandy loam, over large areas. Scattered orange plantings were observed in the valley area to be irrigated, and a very much larger area here is available for citrus development; however, the primary land use will probably continue to be cotton.

This irrigation is provided under the Turkish Federal Reclamation Project and is financed by a World Bank loan. In 1963, the water was being made available to orange growers for the cost of operating the irrigation system—estimated to be 15 lira per decare or $6.75 per acre. (Water for cotton growing was being made available at a cheaper price, 12 lira per decare or $5.40 per acre). It is planned that after 5 to 10 years, some grower assessments or charges will be made to help finance the capital investment of the irrigation project.

Climate. Adana has a climate somewhat like parts of Arizona. Summers are hot, and as early as May the average temperature is 70° F. with an average minimum of 59° F. and an average maximum of 83° F. In June, July, August, and September the average daily maximum is over 90° F. and temperatures over 100° F. are not unusual.

Humidity is rather low, averaging 46 percent for the year compared to an average of 64 percent at the nearby lemon area at Mersin, 58 percent at Antalya, and 73 percent at the Black Sea areas near Rize.

Rainfall averages 24 inches a year and most precipitation is in fall and winter, October through May, and December, January and February usually have the heaviest rainfall. Almost no rain occurs in the hot summer months, June through September.

Under these climatic conditions oranges bloom April 15 to May 15, and early orange varieties, such as the Washington navel, are mature enough to pick and have reached fair color by November 15. Shamouti oranges are harvested, January 15 to May.

Frost is reported to be severe enough to do tree damage about every 10 years, with January and February the months of highest frost hazard. Severe frost was experienced in 1949-51 and in 1963-64 when both fruit and trees were damaged.

Pests and Diseases. The major disease problem is gummosis. The sour orange is therefore used as the main rootstock. Also, in many of the better kept groves, growers whitewash trunks of the trees, probably using some copper sulphate in these whitewash mixtures. Some of the lemon growers maintain basins around the tree trunks to keep irrigation water away and prevent the disease. While gummosis is a major problem, no serious outbreaks were observed in orchards on fairly well-drained land.

In lemons another serious disease, mal secco, is also prevalent. To control this disease, the growers police their groves two or three times a year, cutting out infected branches and burning them. The condition of the orchards seen indicates that the Turkish growers seem to be able to deal with the disease fairly satisfactorily, even though at some cost. In addition, the choice of lemon varieties produced is usually based in part on their resistance to the mal secco fungus disease.

The major pests in the area are Mediterranean red scale, rust mite, bud mite, red spider, and mealy bug. Another, described as a moth, stings the stem end of the oranges and the blossom end of Navel oranges, laying an egg which grows to a worm and infests the fruit. In Turkey this is called honey ball moth; the Latin name is Myelois. In 1963, no control was said to have been found.

It was observed that in the Mersin area, where citrus had been grown for some time and lemons were the major crop, the groves were in good condition; however, in the orchards of the Adana plain there was heavy infestations of red scale observed. The growers are often new to raising citrus and have not yet perfected skills of pest control.

The Turkish Government furnishes the citrus growers considerable assistance in pest control. The Ministry of Agriculture has a general program of spraying orange groves producing fruit intended for export to control the Mediterranean fruitfly. These sprayings are done free of charge, with the government furnishing material, equipment, and application. Toxic bait sprays are utilized.

In addition, a plant protection organization can make both material and spraying equipment available to growers unable to carry out their own pest control program. The agency decides who shall receive this service. Under a credit program established with Agency for International Development (AID) funds, citrus growers can also obtain credit to purchase pest control equipment. In 1963, about 85 percent of growers in the Adana valley reportedly received some help from this organization. (In the Mersin area, by contrast, perhaps only 30 percent of the growers received assistance.) In addition to its application of pest control materials, this organization publishes a booklet on identification of pests and method of control, and also advises growers as to how and when to spray.

The red scale, the most serious pest, hatches two times a year in the Adana area, usually in the period May to July, and then again in the fall, usually in October. Observation of groves in the Adana plain, where the heaviest infestation of red scale was observed, indicate that even with the government program there are few growers producing fruit of export quality. The reason is probably a combination of factors, including lack of experience in applying pest control materials.

Also, trade sources indicate that most of the spray equipment utilized, of European manufacture, was designed to treat interchangeably either vegetable crops or fruit orchards, and thus it does not have adequate power to treat citrus trees. In the Mersin area, both orange and lemon trees are closely planted so that there is not room to get a large spray rig through. In addition, the trees grow to large size, some 25 feet tall, and since no spray towers are utilized it is impossible to reach the tops of these large trees from ground-operated equipment. This presents a continuing problem. The Turkish-produced sulfur used to control the rust mite is reportedly of such quality that satisfactory control is difficult to attain.

Trade sources indicate that the pest and disease problems present in the Mersin-Adana area are quite characteristic of those along the coast at other citrus areas, including those of Antalya, Finike, and other intervening areas.

Mersin (Icel)

Most of Turkey's export citrus is produced in this district of the Province of Icel, which adjoins Adana Province. In 1963, Icel had over one-half the nation's lemon trees and over one-fourth the orange, with estimated plantings of 500,000 lemon trees, 1.6 million orange, and 100,000 tangerine. In 1960, 33 percent of the nation's oranges, 23 percent of its tangerines, and 74 percent of its lemon production came from this province.

The citrus area is situated mainly southwest of the town of Mersin, in a narrow coastal plain less than a mile wide.

Mersin Province has a milder climate than Adana, somewhat more humid and cooler in summer and warmer in winter. Production of bananas in the citrus area is evidence of the milder climate. Most significant is the effect of climate on the citrus season.

Orange trees bloom April 15 to May 15, and this is also the period for the primary bloom of lemons. The orange harvest season lasts from about November 15 to the first of May. This is an area of fairly early orange production with practically no fruit tree-stored beyond June because of the hot summer and the presence of the Mediterranean fruit fly.

The lemon season is short also. The first of the new-crop fruit is

Most Turkish lemons are raised in Mersin's mild coastal climate. Top, a vigorous young grove of Lama lemons near the coast; right, Mersin citrus grove which is irrigated from small stream.

Below, right, trees may grow to great size in Mersin's deep fertile soil. Below, a heavy crop of lemons, large for October, ready to pick.

picked green in mid-October and is gassed to yellow color for export after the fruit is packed. Lemons are exported October through February, but few export shipments are made as late as March or April. This is not because of a lack of markets, but rather because of a lack of fruit of export size.

Turkish lemon groves seen in October had fine crops of large lemons—most of them large enough for November harvest. Almost no sets of fruit of later blooms were observed which would produce fruit for spring or summer harvest.

Apparently the hot summer weather destroys the fruit of any late-season bloom. Weather records indicate that at Mersin the average daily maximum temperature is 77° F. in May, 82° in June, 86° in July, and 87° in August. From June on, maximum temperatures near 100° F. are not unusual and maximum temperatures recorded are 91° in April, 97° in May, 104° in June, and 102° in August.

Therefore, the Mersin lemon area is similar to that at Yuma, Arizona—producing only a winter lemon crop. This is the major limiting factor in extension of lemon production in Turkey. The only lemons available for export after March are tree-stored winter fruit, too mature and too large for export.

The following comparison of fruit sizes in three export shipments illustrates this problem. While not typical of total supplies by size and season, since larger lemons are sold in the domestic market, these data indicate the scarcity of lemons in the popular 160 and 180 sizes for the 31-lb. net export box.

Data on fruit sizes follow:

Fruit size	Month of export November	December	March
	Percent	*Percent*	*Percent*
80	1	—	—
100	17	12	32
120	23	25	30
140	26	29	23
160	25	25	9
180	8	9	6

Trade sources.

In this illustration of actual exports, 40 percent of lemons shipped in November were 120 and larger, compared with 37 percent in December and 62 percent in March. Even more revealing is the fact that lemons of size 160 and smaller represented 33 percent of November shipments and 34 percent of December but only 15 percent of the March exports.

There are no indications that any other citrus area in Turkey will be more successful in solving this seasonal problem. The Black Sea citrus areas—which have a much milder summer climate—have winter temperatures much too low for successful lemon production.

Citrus culture in Mersin is more intense and more expert than in Adana. Groves are usually small—2 to 3 acres in extent; most are cultivated by hand with a little use of animal-drawn tillage tools, while use of tractors is unusual. The deep sandy loam soils seen are excellent for citrus, and trees grow to great size, some as high as 25 feet tall. Groves of large vigorous orange trees were seen, as well.

This area lacks the abundant water supply of Adana, starting 40 miles to the northeast. Small streams are used for gravity irrigation; some water is pumped. Growers interviewed said the water they used was "free." Long-established rights to gravity water make irrigation only a small expense to favorably located groves.

In the future, additional water supplies will be brought to Tarsus and Mersin by canals from the Seyhan irrigation project near Adana.

Irrigation practice seemed good. In some groves, a basin is built around the tree to keep irrigation water away from the trunk—an excellent practice against pythophthora fungus. Some growers were observed to whitewash the trunks of young trees; this also was probably a disease-control measure.

In young lemon plantings, the trees seemed well-grown with good framework development. Some of these new plantings are spaced about 25 feet between trees. In such groves, annual crops are usually grown for the first few years.

In most orchards, however, planting distances are closer, with about 100 to 150 trees per acre. In Mersin, most growers raise their own nursery trees. The lemon grower chooses varieties that are resistant to the fungus mal secco, the most serious cultural problem in lemon groves. The Italian Interdonato lemon is used for its resistant qualities. Another lemon variety called Molla Memet is also favored. Some sources believed that the Molla Memet is a hybrid of a lemon and citron; this is a favored variety for storage as "sleeping lemons." Older plantings are usually of the Lama variety and this fruit is also used for storage.

Antalya

In 1963, this province contained about 20,000 acres of citrus consisting of about 2.2 million orange trees (80 percent of the province's citrus plantings), 225,000 tangerine, 125 lemon and 7,500 grapefruit trees, trade sources indicate. New plantings are reported at the rate of about 100,000 trees a year, and in 1963 an estimated 25 percent of plantings had not yet reached bearing age.

In 1960, Antalya produced 27 percent of Turkey's oranges, 26 percent of tangerines, and 22 percent of total lemon production.

Orange production by variety was estimated about 58 percent Antalya, 5 percent Alanya, 10 percent Finike, 2 percent Valencia, 8 percent Shamouti, and 17 percent "Washington."

Plantings are on the alluvial coastal plain surrounded by high mountains, with an abundance of water. Soils at higher elevations are reported to be light sandy loams, those at lower levels, heavy.

The area is well protected from northern winds, with reported slight frost hazard.

The arable area is large; competing crops include cotton, bananas, peaches, berries, and vegetables. Citrus plantings are expected to expand in cotton areas.

Antalya has an average yearly rainfall of 40 inches. Most of this falls in the 7-month period, October through April, and average rainfall in both December and January exceeds 10 inches. The summer season is dry, with an average of less than an inch of rain per month from June to October.

Summers are hot with average maximum temperature of 80° F. in July and August, and 87° F in September. Average humidity for the year is 58 percent; this level is fairly constant throughout the year.

Oranges are picked November to February. Navel oranges are large with a thin peel, trade sources indicate, and thus have a partly green peel in November and do not attain full color until January.

Citrus groves average 10 decares or 2.5 acres each. Usual planting density is reportedly 25 trees per decare, 100 trees per acre. Old groves are more closely planted than newer plantings, and all old groves are grown on sour orange rootstock while some of the recent plantings are on trifoliate root.

Newer groves are reported to be mostly "Washington"—a term referring to several different varieties, including the Navel-type orange, and other improved foreign non-Navel varieties. New plantings include also a few Italian varieties, such as Moro and Tarocco.

The small groves are usually cultivated by hand, with fruit yield reportedly as high as 20 metric tons, or 600 boxes, per acre.

The major pest is the Mediterranean fruit fly, which may have 5 or 6 generations in a season.

All citrus grown in this area is sold domestically, and there were no citrus packinghouses or processing plants in the province in 1963.

In 1963, leading citrus growers in the Antalya district formed an organization called Antalya Citrus and Vegetable Trade and Industry, Inc. (ANTNAR), to improve packing and marketing arrangements, promote exports and develop a juice industry.[1] This move was stimulated by increasing citrus production. The organization has proposed the construction of a fresh fruit packinghouse, as well as a citrus processing plant which would also process tomatoes, strawberries, and vegetables.

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[1] Reported by E. E. Keller, Vice Consul, and Kenneth A. Byrns, Consul General, American Consulate General, Izmir, Turkey.

Turkish Law No. 202 of February 1963, which provides for a 30 percent corporate tax concession for State-approved investments, would aid such a modernization project.

The province's port facilities are also being improved. Antalya is an orange producing area of increasing importance, but it is likely that little or none of its fruit or citrus products will be exported for many years to come. Production will be sold in the domestic market as fresh fruit or juice.

In terms of commercial shipping, this is an isolated citrus area, illustrating the general problem of developing export trade. By itself, Antalya will not have enough export oranges for regular steamship service.

Izmir

This province has scattered citrus areas with an estimated planting in 1960 of 140,000 tangerine trees, 60,000 orange trees, and 12,000 lemon trees. Production in the province in 1960 is estimated as 49,000 70-lb. boxes of oranges, 50,000 70-lb. boxes of tangerines, and 9,000 76-lb. boxes of lemons. Izmir is representative of several small citrus districts in Turkey. While the industry is important to the local area, 1960 production was estimated as only 5 percent of Turkey's orange and tangerine crop.

A citrus area is located less than 10 miles west of Izmir, on the coast. Here, although the level coastal area where citrus can be grown is small, there is sufficient area for considerable expansion. The soils seen were sandy loams, excellent for citrus.

An excellent Satsuma orange grove, illustrating turf culture. This is located near Izmir city.

Many of the groves are mixed plantings of tangerines and oranges, as most fruit is sold in the Izmir market. Most interesting are the groves of Satsuma oranges. Although this fruit is sold in the domestic market, about 10,000 boxes per year are being exported in recent years to Europe, by rail via Istanbul. All such exports are field-packed, fully wrapped in 28- to 30-pound boxes. The fruit is untreated before packing, and no packinghouses exist.

In this area, oranges and Satsumas bloom in April and May, and Satsumas are first picked at the end of October when the peel is breaking in color. Early fruit exported is reported to color to yellow in transit. In late October 1963, the Satsuma oranges, which the author sampled, had a green peel or were just breaking in color, but the flesh of the fruit was well-colored.

Harvesting of Satsuma oranges is usually complete by the end of December. The set of oranges observed was good and the fruit large.

Satsuma oranges and tangerines are grown on trifoliate orange rootstock, oranges on sour orange root. All the area is irrigated; while this sometimes requires pumping water, some growers have access to free gravity water. Orange trees grow to large size—evidence of the favorable cultural conditions.

The Ministry of Agriculture furnishes equipment and material for pest control and the grower, labor.

Other small citrus districts are located along the coast south and west of Izmir and at Bodrum, Milas, and Marmaris.

The inland Aydin district is an example of the micro-climates in Turkey;

A Sultanhisar orange tree, in Izmir Province. It is notable for tree size and spacing of planting.

it is near both areas of large fig production and areas too cold for citrus. Strong winds are occasionally experienced. Some frost is expected each year, with minimum temperatures of 15-18° F.; frosts usually occur in February.

The groves which the author observed were some of the best-cared-for in Turkey. Orange trees grow to large size—25 feet tall at 27 years of age. Trees are planted 25 feet to 30 feet apart and allowed to grow with little or no pruning except removal of dead wood. The deep light sandy loam soil is ideal for citrus.

Irrigation is a problem since water has to be pumped from depths of 100 to 150 feet. Such pumped water is said to cost 20 lira per decare or $9.00 per acre per irrigation. Since water is expensive it is used sparingly, perhaps a factor in the fine tree condition observed.

This district grows an unusual orange, said to be very resistant to frost damage. This variety or group of varieties is called Sultanhisar, round non-blood oranges, some of which are seeded and some seedless. The trees on sour orange root grow to great size and have thorns. In Turkey, this is considered a late variety, and the fruit is picked from January 15 to as late as mid-March.

This fine citrus area has limited potential because of the smallness of the available area with temperatures mild enough for citrus. The most interesting feature of the area's citrus production is the apparent cold resistance of the fruit and trees of the Sultanhisar orange.

Black Sea Provinces

Citrus is grown in the provinces of Artvin, Giresun, Ordu, Rize, and Trabzon, which are most important for tangerines. In 1960, these five provinces contained an estimated planting of 68,000 orange trees, 271,000 tangerine trees (including Satsuma oranges), and 11,000 lemon trees. About 60 percent of the plantings and about 80 percent of production for the Black Sea Provinces are identified with Rize. Satsuma oranges are the most important variety; in Turkey these are called "Rize" tangerines, and data on plantings and production are both reported as tangerines.

These Black Sea citrus areas have a cool damp climate. At Rize, the average minimum temperature is 39°F. in January and 67° in August. Frosts occur most years in January and February. Average maximum temperatures are 51°F. in January, 78°F. in August, and 74°F. in September.

Rainfall averages 96 inches a year, with over 10 inches of rain per month usual in the 5-month period, September through January. April and May have least rainfall, about 4 inches a month. Humidity is high, averaging 73 percent for the year, and ranging from about 70 to 77 per cent.

Because of these climatic factors citrus is raised without irrigation, often on sloping or terraced ground. Some groves are operated as a turf culture and tea is a competing crop in a part of the citrus area.

These citrus areas are of importance only to the domestic market, as a major source of Satsuma oranges for Istanbul and Ankara in November and December.

Cultural practices

Varieties and rootstocks

In 1963, nearly all citrus was grown on sour orange rootstock. Exceptions to this were the Satsuma orange plantings in the Black Sea coast near Rize and Ordu, and also at Izmir where trifoliate orange root was used because of the frost hazard. A few new plantings at Antalya are also planted on trifoliate root.

Commercial citrus varieties in Turkey in 1963, were as follows:

Kid Glove oranges:
- Satsuma
- Clementines
- Willow Leaf Mandarin

Sweet oranges:
- Shamouti
- Washington Navel
- Magnum Bonum
- Local non-blood varieties[2]
- Trablus (3-4 seeds midseason)
- Alanya (seedless early type)
- Finike (seeded midseason type)

Lemons:
- Interdonato (large early Italian variety)
- Lamas (a fine Turkish lemon)

Other local lemon varieties:
- Yedi Veren
- Molla Mehmet
- Demre Dikensiz
- Villa Franca (few)
- Monachello (few)

Grapefruit:
- Masch seedless

The Ministry of Agriculture grows some of the trees planted, making them available on application at a cost of 3 Turkish lire, or $0.33 each. Ministry of Agriculture nurseries are located at Dortry, Mersin, and Antalya.

Most Turkish trees, however, are grown in private nurseries, which may furnish different varieties or larger trees than the Ministry nurseries, or may serve a grower who does not wish to wait for Ministry nursery trees. These private nurseries sell trees for about $7.50 Turkish lire, or $0.83.

Pests

Major commercial pests, in order of importance for most producing areas, are the Mediterranean fruitfly, California and Mediterranean red scale, rust mite, bud mite, red spider, mealybug and aphids.

The Mediterranean fruit fly is present in all areas and causes fruit losses each year, limiting the harvest season of oranges and tangerines.

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[2] Probably mostly Belladi (Baladi) types.

A black aphid was observed in citrus areas near Izmir, so a vector of tristeza may be present should this virus ever become active in Turkey.

Oil sprays are used to control scale and mite pests. In groves where the fruit is to be used for exports, bait sprays are used by the Ministry of Agriculture as a control measure for the Mediterranean fruitfly.

The government program for scale and fruit fly control seems to vary greatly between districts as to effectiveness. In some districts, heavy red scale infestations were observed in groves reported to have been treated under the government program.

In Mersin, where commercial citrus techniques are best developed, most growers handle their own pest control. It would seem that the government program is a stop-gap effort which will be used only in areas where citrus is a crop of limited commercial importance.

In addition to chemical control of pests, the experiment station at Antalya is reported to be producing some insects for biological control of the mealybug. The ladybird beetle (*Cryptolaemus Montrousiere Mals*), raised for this purpose, is released in mealybug infested areas.

Diseases

In 1962, Dr. Gerald G. Norman of the Food and Agriculture Organization of the United Nations (FAO) spent 6 months in Turkey investigating citrus virus diseases. Excerpts indicate the high incidence.[3]

Stubborn Disease. "The symptoms observed included stunting, chlorosis, shoot-growth with erect or rosetted leaves and multiple buds, acorn-shaped fruit, dwarf and malformed fruits with curved axes and thickened skin at the calex, blue albedo in the fruit of both grapefruit and oranges, pink albedo in Navel oranges, and, finally, erratic off-season blooming and fruiting. These symptoms were seen on a wide range of sweet and blood orange varieties and on white- and pink-fleshed grapefruit. Washington Navel and Thompson Navel oranges appeared to be most severely affected. The disease occurs in both imported and local varieties, and is of unquestionable economic importance.

Tristeza. "Some trees in one area of Turkey displayed symptoms indicating the possible presence of tristeza. . . . of the trees of Washington Navel on sour orange, three were diagnosed as probable and seven as possible for tristeza. Such tests are not to be considered as conclusive. If subsequent tests by Turkish Government agencies should demonstrate the presence of tristeza in these trees, there is no need for concern, since all samples were from old trees which apparently had been infected with the virus for a long time without any indication of spread.

Psorosis. "The eruptive or 'scaly bark' strain of psorosis virus was found to be rare. This may be due to the slow growth rate of trees resulting from inadequate nutritional levels.

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[3] *Report to the Government of Turkey on Citrus Virus Diseases,* by Gerald G. Norman. FAO Report No. 1641, Rowe, 1963.

"In the Alanya area, 20 Washington Navel trees used for nursery propagation were positive. In Antalya, 94 percent of the young Valencia trees and 99 percent of the Washington Navel oranges, planted for future sources of budwood, were found to be infected. In Mersin, 18 of 24 Thompson Navels and 12 of 16 Jaffa trees were also positive. In Finike, 20 trees of Washington Navel were examined in each of five widely scattered orchards and all were found to have definite psorosis symptoms. In a variety collection near Cisme, including blood and Mandarin oranges and grapefruit, almost all trees were infected. In conclusion, psorosis seems to be present generally throughout Turkish citrus plantings.

Xyloporosis. "No symptoms of xyloporosis were observed on sweet orange on grapefruit or sour orange rootstock. There can be little doubt that considerable losses occur in susceptible varieties due to this virus.

Impietratura. "Very few trees susceptible to exocortis virus were found in Turkish plantings. However, it should be noted that only by indexing can the true incidence of exocortis virus be established.

"None of the following virus or virus-like diseases was observed during the survey: Satsuma dwarf, vein-enation, yellow vein, seedling yellows."

"In addition to these virus diseases, gummosis (Phytophthora) is probably the worse disease problem, particularly in groves on heavy soils.

"Mal secco (Deuterophoma Tracheiphila) is the most serious disease of lemons, and in older groves trees damaged and killed by this fungus were observed. The major control is to prune away and destroy infected foliage."

Research

Citrus research is carried on by the Ministry of Agriculture at the citrus experiment station near Antalya, and in cooperation with the University of Ankara. In addition to research in citrus, this University has courses in citrus culture. At the citrus experiment station at Antalya, foreign citrus varieties have been introduced for observation. Other research involves investigation of rootstocks, including Troyer and Morton Citrange, Samson tangelo and Cleopatra Mandarin, and others.

A program is reported underway to index virus diseases. Experimentation is also being carried on to develop nucellar strains of Turkish varieties. For the future, experimentation is planned on nutritional problems, including leaf analyses, and on nemitode problems and control.

Costs

Cost of production

Field observations indicated that actual cash costs of $105 per acre of operating most groves seems reasonable. Even in this estimate, most costs are not cash outlays, since in grower-operated groves a cash outlay of only $65 per acre per year would be required for fertilizer, pest control materials, and tools. Therefore, considering the grower's labor as an expense, the cost of orange grove operation by 1964 probably ranged from about $65 to $110 per acre per year in most groves. At these costs, orange groves producing 200 70-lb. boxes per acre would have an average cost of $0.33 to $0.55 per 70-lb. box, or about $0.20 to $0.35 per 40-lb. net half-box.

The cost of mal secco control, and resulting pruning and tree replacement, probably make lemon production somewhat more costly; however, higher lemon yields may compensate for this. If the average cost of lemon grove operation ranges from $100 to $120 per acre per year, and the average yield is 250 76-lb. boxes, cost of production in most commercial groves probably ranged from about $0.40 to $0.48 per 76-lb. box, or about $0.20 to $0.25 per 31-lb. net half-box.

Taxes on land in citrus areas are nonexistent or nominal. There is, however, a 10-percent income tax based on estimated crop value. Even this is not applied equally, since small farmers may pay no tax or else a smaller tax than large growers. In Turkey, 10 acres would be considered a "large" citrus property.

As a "cost" factor in citrus production, taxes must be considered nominal and of little consequence.

Cost of planting

In 1963, trade sources estimated the cost of planting a citrus grove at $357 per acre and 5 years of cultural care at $630, making a total cost of a 5-year-old grove less than $1,000.

Based on cost of trees and wages of labor, many citrus groves can be planted at cost of only $250 per acre, and the first 5 years' care should not exceed $500 per acre, making the total estimated cost of a 5-year-old grove about $750 per acre. This cost level may be considered generous in some favored circumstances.

It would seem that because of Turkish lending policies an enterprising grower having the land could obtain nearly 100 percent financing for citrus grove development, in 1963.

Cost of picking and packing

Picking and packing costs estimated at 50 cents per 40-lb. net box of oranges and 57 cents per 31-lb. net box of lemons indicate that materials, such as boxes, nails, paper wraps and labels comprise about 60 percent of total packing cost. The wages of packing labor are estimated at about 12 percent of total cost.

These are the costs of packing export fruit in a packinghouse. Field packing, still used for most exports in 1963, was somewhat cheaper. In the future, more fruit will probably be packed in packinghouses, but it appears that only a substantial increase in field wages will make the packinghouse competitive with field packing. These data are sufficient to indicate that Turkish citrus can be prepared for export in full-wrap-packs at a reasonable cost level.

Break-even costs

The break-even costs of production, picking, packing, and transport of citrus for shipment to Germany indicate that half-boxes of both lemons and oranges can be delivered to Hamburg for about $1.25. Turkey can produce and market fruit at competitive prices because of good yields and low wages. While little or no fruit is likely to be delivered at these break-even rates, Turkish oranges and lemons can be delivered in European markets for approximately $2.00 per half-box and still return a fairly good price to the grower.

Table 3.—CULTURAL COSTS: Estimated costs for the planting of a citrus grove and its care for the first five years, and cost of annual citrus production, Adana, 1964

Planting and care, first 5 years	Total cost	Citrus production	Cost per year
	U.S. dols. per acre		U.S. dols. per acre
Plowing	15	Cultivation	20
Leveling	50	Weed control (hoeing)	15
Layout of grove	10	Pruning	8
Trees	80	Irrigation (10-14 times)	20
Planting	20	Fertilizer (chemical and manure)	25
Irrigation system	75	Fertilizer application	2
Total planting	250	Pest control [1]	10
Cultural care for first 5 years	500	Other	5
Total	750	Total	105

[1] In groves where the Ministry of Agriculture Plant Protection Division supplies the equipment and material, the cost may be half the indicated amount in each category.

Trade sources and field estimates.

This is illustrated further by estimated delivered costs at various prices of fruit on the tree. As an example, an orange grower could receive $50 per short ton for fruit on the tree, and the fruit could be delivered to Hamburg, c.i.f., for $2.12 per 40-lb. net weight box, and could be placed on the Hamburg market landed, duty-paid, at a total expense of $2.78. In like manner, an exporter paying $71 per short ton for lemons on the tree could deliver them c.i.f. Hamburg for $2.21 per packed half-box of 31 pounds net weight, and place the fruit on the Hamburg market landed, duty-paid for $2.54. Trade sources indicate that these on-the-tree prices and costs were indicative of 1963 export trade.

Table 4.—EXPORT COSTS: Estimated costs of picking and packing citrus for export, Turkey, and estimated breakeven costs of exporting citrus to Hamburg, Germany, 1963

Picking and packing	Oranges	Lemons	Breakeven costs of exporting	Cost	
				Oranges	Lemons
	U.S. dols. per 40-lb. box	U.S. dols. per 31-lb. box		U.S. dols. per 40-lb. box	U.S. dols. per 31-lb. box
Picking	0.05	0.07	Production	0.20–0.35	0.20– .25
Box	.20	.20	Picking[1]	.05– .05	.07– .07
Paper wrap	.07	.09	Packing[2]	.45– .45	.50– .50
Packing, labor	.06	.09	Shipping[1]	.50– .53	.42– .45
Nails and wire	.02	.02			
Labels	.02	.02	Total	1.20–1.38	1.18–1.27
Hauling	.03	.03			
Storage at dock	.02	.02			
Other	.03	.03			
Total	.50	.57			

[1] Costs reported by IGEME, **Turkish Citrus Fruit, a Study of Export Promotion and Marketing,** Ankara, 1962.

[2] Costs of packing in a packinghouse; field packing could probably be carried out at a lower cost.

Trade sources, field estimates, and IGEME.

Returns to growers

Turkish citrus growers were making good returns in 1963:

An orange grove yielding 200 70-lb. boxes per acre would return a gross of 2,400 lira per acre ($267) at a price of 40 krus per kilo ($40 per short ton) on the tree. At a cash cost of 14 krus per kilo ($14 per short ton), the grower would earn $173 per acre.

A lemon grove operated at a cost of 12 krus per kilo ($12 per short ton) would return a net of $327 per acre at an on-the-tree price of 50 krus per kilo ($50 per short ton).

Two factors should be kept in mind: (1) most growers receive an additional return since wages of grower-labor are included in the estimated cost of operation, and (2) the average size of grove is small, so that a lemon grower with a return of $300 per acre may earn less than $1,000 on a 2½-acre grove.

The earnings per acre from citrus are sufficiently attractive, however, compared to earnings from other crops, to be a real incentive to citrus.

Marketing

How Turkish growers market their citrus is well described in the following quotations from a report by the Export Promotional Organization, (IGEME):[4]

"The common practice of domestic, as well as export buyers, is to acquire the fruit on the tree 2 to 3 months before picking time, and sometimes even earlier, by estimating the total yield of a grove, at a lump sum, of which 25 to 30 percent is paid at once, with the balance payable at the time of harvest.

"Most buyers engage their own crews for picking, packing, wrapping, as well as transportation, and supply their own boxes, nails, wire, and wrappers. A few export buyers secure their supplies and packing services from the Güven Plant.

"The larger exporters, who have the necessary financing facilities, purchase their estimated export requirements directly from the growers, as mentioned before, and have their fruit export-packed and sorted either at the grove or at the packing plant. They may also purchase some tonnage from domestic wholesalers, at a later date, to complete their orders.

"The smaller exporters usually buy only part of their estimated requirements from growers, in accordance with their financial facilities, and mostly from wholesalers at prevailing prices during the season. Some business is also done by exporters for the account of domestic wholesalers, in which case the wholesaler assumes all risks for quality, packing, and safe arrival at destination, the goods being mostly sold at auction for his account, the exporter deducting a commission of about TL 2.0 (22 U.S. cents) per box to cover expenses and profit. In this case the exporter handles such shipments as an export agent for the wholesaler's account.

"Some growers pack and market their own fruit domestically, as well as for export, doing the whole business as an integrated operation.

"Actually, there is no rigid and definite pattern of export buying, and various methods are being used, depending on the aggressiveness, organization, and financial ability of each individual exporter.

"There is a lively competition during the purchasing season between exporters and domestic buyers and very often to the detriment of exporters who, being limited by very competitive prices in foreign markets, are either unable to purchase their requirements at profitable margins or have to follow the domestic prices in the hope that the foreign market prices will improve by the time the merchandise reaches its destination to be sold at auction."

Travel through citrus areas indicated to the observer that availability of export lemons was much greater than that of oranges. The lemon groves around Mersin with export quality fruit were located fairly close together, and picking and packing crews could be moved easily from one lemon grove to another.

Buying oranges for export was much more difficult. Many orange groves were observed to be mixed plantings of several varieties and groves

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[4] *Turkish Citrus Fruit, A Study of Export Promotion and Marketing,* IGEME, Ankara, 1963.

were scattered over a wide area. Some groves with export varieties were scale-infested, making the fruit unfit for overseas markets. Only a very few orange groves in 1963 had uninfested export quality fruit in quantity, and exporters had difficulty finding the small quantity of oranges they exported in the 1963-64 season.

Domestic marketing

Citrus fruit for sale in a major domestic market, requiring truck transport over a considerable distance, is usually selected and packed in boxes. As in exports, this involves mostly field packing using sight grading and sizing. In addition, some low-grade fruit is hauled to market by trucks in bulk, unselected and unwrapped.

The fruit buyer packs the fruit and transports it to market. Truck transport is preferred—even to coastal markets such as Istabul—because of time saved and resulting better condition of fruit on arrival.

In 1963, growers were paid \$1.91 to \$3.06 per box for lemons on the tree and \$2.12 to \$2.82 per box for oranges.

Average price of citrus fruit for sale in Turkey has tended to increase. The average wholesale price of oranges was about 9 kurus each in 1950 in Istanbul compared with 35 kurus each in 1959, and the lemons were 11 kurus each in 1950 compared with 29 kurus each in 1959. This was partly a reflection of reduction in monetary values but prices also increased in terms of dollar value.

Domestic consumption

In the period 1948 to 1960, estimated total population of Turkey increased from 19 million to 27 million. As population increased, domestic consumption of citrus also increased sharply from 5 pounds of oranges and tangerines, and 1½ pounds of lemons, in 1948, to 19 pounds of oranges and 4 pounds of lemons in 1960.

It is likely that continued growth of domestic demand for citrus will use most production in the near future, even though production is growing.

Until 1964 all citrus had been sold as fresh fruit, although some was used as juice fruit in the market and in homes. Future consumption, of oranges in particular, may be increased by development of a juice industry which would offer citrus to the Turkish consumer in another form and would in addition extend consumption of oranges throughout the year.

Both increased purchasing power and better transportation have been important influences in increased per capita citrus consumption. Turkish roads are being improved at a rapid rate, which will continue to widen the domestic market for citrus by better access to market areas and also, probably, through lower transport costs.

"Sleeping lemons"

"Sleeping Lemons" play an important part in lemon marketing in Turkey. The term "sleeping lemons" is used to describe fruit stored in caves for summer sale. Lemons to be stored are usually picked and packed—fully wrapped—in boxes in much the same manner as lemons for export. Packed lemons are trucked to caves near the town of Nevsehir at Göreme and Urgup, about halfway between Adana and Ankara.

The natural caves where the fruit is stored have a temperature of about 58° F., reported to be fairly constant for the storage period up to 5 months. During storage, a decay of 20 to 30 percent of the pack is expected. When fruit is removed from storage, it is repacked to remove decayed fruit. Each year an estimated 500,000 to 600,000 boxes, 48 pounds each, of lemons are said to be stored in this manner.

The storing of "sleeping lemons" gives Turkey a year-round supply, and loss of fruit in storage is more than made up by the summer price of stored lemons of $7.66 to $11.49 per 76-pound box.

The thin-skinned, juicy, stored lemons are preferred by the Turkish consumer. In mid-October 1963, when both "sleeping" and new crop lemons are available in retail shops, the cured, stored "sleeping lemons" were observed to sell retail at $15.32 per 76-lb. box, or about twice the price of new crop lemons. Even at this higher price "sleeping lemons" were in demand.

Exports

Although orange exports have increased in the period 1948-62, the quantity exported has nevertheless been of little significance, varying from about 1 to 5 percent of production. The 375,000 boxes exported in 1962-63 set a record achieved at a time of frost-caused shortages in the Mediterranean. While exports have increased, there is no indication that Turkey will be a source of more than minor supplies of oranges for international markets in the next 10 years.

Lemon exports have maintained a somewhat higher average volume since 1948. However, by 1964, total exports had yet to exceed 500,000 boxes in any year. Volume of lemon exports has not been sustained, but instead has fluctuated widely from year to year. This would seem to indicate that Turkey has been a residual supplier, exporting mostly in seasons of temporary shortages in competing lemon producing areas.

Export customers

Until the 1963-64 season, orange exports have been small and a market preference has not been established. The much increased exports to Western Europe in the 1962-63 season were part of an abnormal pattern

Table 5.—TURKISH CITRUS: Exports by market area and variety, 1952-53 and 1962-64 (year beginning October 1)

Destination	Oranges			Tangerines			Lemons		
	1952-53	1962-63	1963-64	1952-53	1962-63	1963-64	1952-53	1962-63	1963-64
	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes
Europe, Western:									
Belgium-Luxembourg	(1)	—	5	(1)	—	—	1	2	17
France	—	(1)	—	—	—	—	—	11	8
Germany	2	178	28	6	13	18	54	283	213
Netherlands	—	101	22	(1)	(1)	—	2	24	54
Total, EEC	2	279	55	6	13	18	57	320	292
Austria	—	3	—	1	—	12	5	1	—
Finland	—	—	—	—	—	—	—	2	—
Sweden	(1)	2	—	1	—	—	(1)	1	3
Switzerland	—	3	—	—	—	—	—	2	—
United Kingdom	—	26	16	(1)	—	—	1	13	5
Yugoslavia	—	—	16	—	—	—	—	—	—
Total Non-EEC	(1)	34	32	2	—	12	6	19	8
Total Western Europe	2	313	87	8	13	30	63	339	300
Bulgaria	5	—	—	—	—	—	6	—	5
Czechoslovakia	14	—	—	—	—	—	23	—	26
Hungary	—	—	—	—	—	—	9	—	—
Rumania	47	—	—	4	—	—	37	—	—
Total	66	—	—	4	—	—	75	—	31
Total Europe	68	313	87	12	13	30	138	339	331
Lebanon	—	—	(1)	—	—	—	6	—	—
Saudi Arabia	—	22	9	—	—	—	—	—	—
Syria	—	27	32	—	—	—	2	—	—
Other	—	—	—	—	—	—	—	1	—
Total other markets	—	49	41	—	—	—	8	1	—
Total exports	68	362	128	12	13	30	146	340	331

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[1] Less than 500 boxes.

brought about by the frost-caused shortages in Spain. This seems to indicate that Turkey is likely to be a residual supplier of oranges to the highly competitive Western European markets. In the long run, less discriminating Middle Eastern markets, such as Syria, which are accessible to Iskenderun and Adana, may become increasingly important export outlets for oranges and tangerines.

The pattern of orange exports in the 1963-64 season should be considered a fairly reliable basis for expectations for normal years in the near future with about 40 percent of orange exports going to EEC countries, 25 percent to non-EEC countries, and 30 percent to Middle Eastern markets. The location of Turkey also makes orange exports to Eastern Europe a future possibility.

Lemons have a more established export pattern; about half the exports have been made to Western Germany. The United Kingdom, Austria, and the Netherlands have also been recent importers of small quantities. In Eastern Europe, Czechoslovakia has been the most important customer, followed by Poland and Bulgaria. Turkey is one of the logical suppliers in response to any increased Eastern European demand for citrus, and improved economic conditions in that area could influence Turkey's citrus export pattern more than EEC membership.

Season

Nearly all Turkey's orange exports are made in the 6-month period, November through April, and about 80 percent in the 4-month period, December through March.

Turkey thus has no seasonal advantage in export marketing, since the months of highest export volume in Turkey correspond with early exports from Israel and with the season of major export volume from Spain, Italy, and North Africa.

The very hot summers in the Arizona-like climate of the citrus areas indicates that there would be very limited possibilities of extending the harvest season, even if late maturing varieties were grown. Even late oranges would probably be overripe by June, and though control of the Mediterranean fruit fly would make more fruit available, climate would nevertheless remain the dominant controlling seasonal factor.

Lemon exports have an even more restricted season than oranges, and nearly all exports are made in the 5-month period, November through March, with most in the 3-month period, December through February.

While the domestic marketing season is stretched by storing "sleeping lemons" the export season will remain restricted because of climatic factors which result in one crop of winter lemons.

This export pattern puts Turkish lemons in direct competition with the major lemon harvest season in Sicily, Greece, Israel, and Spain.

This lack of a summer lemon crop, like the Italian Verdelli, is a very important handicap to the Turkish lemon industry.

Export marketing

Each exporting firm arranges its own cargo space; however, the Turkish Government arranges for at least one sailing per week from Mersin to Western Europe during the lemon export season. Up to and including 1963, no ships were available with refrigerated stowage, so that all export citrus was carried in ships with only ventilated cargo space. In 1963, sea freight rates from Mersin to Hamburg were reportedly about $20 to $25 per metric ton, or about $0.28 to $0.35 per 30-lb. box. This seems a very reasonable freight cost, considering the distance from Turkey to North Sea ports.

In contrast, truck transport of domestic fruit from Mersin to Istanbul in 1963 cost about $11 per metric ton or $0.16 per 30-lb. box. Of course, domestic fruit was not packed in the export-type box, but this seems to illustrate that the domestic freight from Mersin to the largest domestic market is about half the export sea freight.

Most fruit for the domestic market is carried by motor trucks that carry 5 to 10 tons in a load. Only a small quantity of fruit is sent by sea because of the time involved—about a week. Ships serving Mersin and Istanbul stop at many ports; this prolongs the voyage and may lead to decay and resulting loss of fruit.

Packing

A large packinghouse has been built at Mersin, and in addition in 1964 two smaller new packinghouses equipped with machinery from Cyprus were put into operation.

While packinghouse facilities have been available for some time, field packing has been used for most citrus exports, since because of the low wages it remains cheaper. Field packing usually takes place in the grove under large trees near a road. Picked fruit is piled on a canvas on the ground, then is hand-carried in baskets to the packing station. Packing material is brought to the site. Lemons that the author observed being field-packed were sight-graded and sized into piles by one group of women. Another wrapped fruit, a third group place-packed the fruit in boxes. Export boxes are closed and wrapped with wire, then transported by truck to a dockside warehouse.

Field-packed lemons are fully wrapped, whether for export or for storage as "sleeping lemons."

Early in the season, when lemons are still green they are gassed—after packing—in transit from the field packing station to the dock. Roadside gas chambers for this purpose are available. These are simple structures without means of air circulation.

Field-packed fruit is not washed or treated in any manner. Late in the season some diphenyl-treated paper is used for lemon wraps. Field-packing will probably continue for some time.

Exporters Union

Activities of this Union are described by IGEME:

"The Exporters Union (Birlik) in Mersin records all citrus exports, irrespective of ports of embarkation. Citrus exporters must be members of that union and all exports must be registered in advance of shipment.

"The total membership of Birlik consists of about 300 firms, of which about 80 firms are registered as citrus fruit exporters. During the 1960-61 season only 30-35 firms were actively engaged in citrus fruit exports, of which only 15 firms shipped 300 tons or more."

Registration of export fruit involves recording the quantity of fruit and f.o.b. sales price when minimum export prices are in force. When fruit is sold on consignment, or is to be auctioned, the registered price is subject to adjustment.

The Exporters Union also issues export licenses involving trade under bilateral agreements. This organization is financed by a fee of 2 percent of f.o.b. value of exports.

Inspection

Turkey will utilize EEC citrus export standards, which are administered by the Ministry of Agriculture. When an export shipment is packed, the exporter advises the Government office and inspection may then be made either in the field (or packinghouse), or else on the dock at time of loading, or both. Inspectors may include representatives from the Ministries of Agriculture, from Commerce and Birlik.

In 1962, about 20 percent of the fruit inspected was rejected for export, according to trade sources. Early in the season, the major

Most Turkish export lemons were still field-packed, unwashed and untreated, in 1963. Below, left, women sight-grading, sizing wrapping, and packing fruit in the field.

Below, fruit, packed ready for export, waiting in the field.

reason for rejection was size selection, and later in the season, decay. Some exports were rejected because of scale infestation, also.

Promotion Center

Export Promotion Research Center (IGEME) is Turkey's autonomous export promotion center, created in 1960 by Law No. 118, and operating under the control of the Ministry of Commerce.

It is the goal of IGEME "to promote the quantity and the quality of Turkish exports to the highest point and obtain higher foreign exchange earnings." To accomplish this, studies are made of agricultural industries indicating production and marketing data, and outlining problems and suggested solutions. Foreign market data are also provided. One such basic study has been prepared on "Turkish Citrus Fruit, Export Promotion and Marketing." These studies are prepared with the assistance of the export trade as well as government officials.

In addition to such studies, IGEME publishes a weekly bulletin for the Turkish trade. This contains foreign and domestic crop information, as well as information on foreign markets which is supplied by commercial attaches in market areas.

The Turkish exporter, therefore, has the assistance of this government-sponsored market promotion organization.

Government assistance

The Turkish Government is very much interested in expanding citrus exports to earn more foreign exchange. While assistance described in the following excerpts was available to exporters in 1964, this quotation serves

Table 6.—TURKISH CITRUS: Monthly exports by variety, November 1958-October 1960

Month	Lemons 1958-59	Lemons 1959-60	Oranges [1] 1958-59	Oranges [1] 1959-60
	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes
November	12	5	9	71
December	75	13	117	122
January	19	33	39	121
February	13	29	58	67
March	—	10	31	8
April	6	—	17	5
May	—	—	10	1
June	—	—	1	—
July	—	—	—	—
August	—	—	—	—
September	—	7	—	—
October	—	32	—	(2)
Total	125	129	282	395

[1] Includes tangerines, not separately classified by months. [2] Less than 500 boxes.

to illustrate the degree of government interest in exports, as well as the direction future government assistance may take.

"It is obvious that by facilitating export procedures, by removing hindrances, by creating the possibility of better margins of profit, more private firms will be encouraged and attracted to invest their efforts, time and money in the export field. It is recommended:[5]

1) To discontinue minimum price registrations. This subject is also treated under a separate heading.

2) To reduce income taxes on profits derived from exports to 50 percent of normal taxation rates.

3) To authorize exporters to retain a part of their foreign exchange for travelling or advertising expenses abroad, or to sell to banks at the rate applied for the sale of foreign exchange to Turkish travellers, or for imports of goods outside of quotas.

4) In the case of farmers' export cooperatives, they should be authorized to use part of their proceeds for extra-quota imports of fertilizers, insecticides and farm implements."

Major government assistance to the industry is the pest control operations under the Ministry of Agriculture.

In February 1963, Law No. 202 provided a tax concession of 30 percent for investments approved by the State Planning Organization. This assistance will be used when, and if, citrus processing plants are established.

Competitive aspects

In comparing sales of Turkish "round" or common oranges and Turkish Shamouti oranges with sales of Moroccan oranges, the first thing to be observed is the larger size of the Turkish fruit. Also, in March 1963 and January 1964, the Turkish Shamouti oranges selling at Hamburg auction brought slightly higher prices (about 25 cents per box) compared to those of common round oranges. The Moroccan box was about 15 pounds heavier than the Turkish pack, but both Hamlin and Navel oranges from Morocco sold for about $2.50 more per box than Turkish fruit. On an equal-weight basis, Turkish oranges were discounted at least $1.50 per box. (See price tables, pp. 33-35)

The March 1963 auction at Hamburg recorded a lesser discount for Turkish fruit compared with Spanish and Moroccan. The most interesting comparison here is the discount on an equal-weight basis of the Turkish Shamouti with the Israeli.

In the future, fruit selection, packing and transport may improve the position of Turkish oranges in Western Europe, but a substantial improvement is necessary even to equal the return of competitiors.

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[5] **Turkish Citrus Fruit, A Study of Export Promotion and Marketing,** IGEME, Ankara 1962.

Turkish oranges will not create any serious competition in Western Europe for U. S. winter orange exporters. They are sold at discount prices, hence, only small quantities are likely to go to Western Europe.

Lemons will be Turkey's more consistent citrus export to Western Europe. Because of the short season, Turkish lemons will compete with U. S. lemons only during the period November to April.

Auctions at Hamburg in March, October, November, and December 1963 illustrate the full seasonal range of prices obtained for Turkish lemons. In October, early Turkish lemons sold about $1.00 per 35-lb. box less than Arizona lemons, but $1.00 per box more than lemons from Chile. The low prices of the fruit from Chile may have been caused by its condition. There was little difference in price paid by size for Turkish.

In November, Turkish lemons brought about 25 cents more than Italian Prima grade lemons, but 50 to 75 cents less than Arizona lemons. Again there was little price-size differential in Turkish lemons.

About the same relationship obtained in the December auction. However, most significant in this sale was the fact that the largest Turkish lemons sold for $1.00 per carton less than the smallest Turkish fruit.

In the March auction, this price-size relationship was accentuated, and the smallest fruit brought $1.50 more per carton than the largest Turkish lemons. This is an illustration of the effect on market prices of a preponderance of large-sized lemons in Turkey, December to March.

Therefore, while early Turkish lemons have no price-size disadvantage, they have a marked disadvantage in January, February, and March, and will offer U. S. lemons little competition in sizes 150 to 200 during these months, since the volume of Turkish fruit in these sizes will be very low.

The auction prices in Rotterdam in December 1962, and January 1964 are a further illustration of the competitive position of Turkish lemons. In both auctions, Turkish lemons sold at prices comparable to prices obtained for First Category Italian lemons, but about $1.00 per carton less than Arizona lemons. Medium-size fruit brought highest prices.

A different situation is illustrated in the Antwerp auctions of November 1962. Here Turkish lemons were sold in competition with U. S. lemons in a market dominated by Arizona and California fruit. In four of these auctions, Turkish lemons sold at discounts of about $2.00 per carton to both California and Arizona lemons. In November 1962, Arizona fruit brought a premium of over $3.00 per carton over Turkish fruit. The best comparison Turkish fruit made was on December 3, 1963, when California lemons sold at a premium of only $1.00 a carton over both Turkish and Italian fruit.

In these comparisons, it should be remembered that the lemons sold here from Greece, Turkey, and Italy, are their best grades while some of these premiums are attained with only choice-grade Arizona and California lemons.

These prices indicate that Turkey can compete with Italy, Greece, and

Spain on about an even basis in the early winter season October through December, but has a price-size disadvantage January through March because of the preponderance of large Turkish fruit.

Turkish lemons sell at great discounts in markets where Arizona and California lemons are well-established and Turkish lemons have no competitive advantage over U. S. lemons in any Western European market.

As the selection and packing of Turkish fruit improves, comparative auction prices may be somewhat better, but the disadvantages of short seasons and large fruit size will remain the most significant factors and Turkish lemons will offer U. S. lemons exporters only limited competition, primarily in the months of November, December, and January.

Turkish grapefruit has sold in Western Europe at competitive prices compared with other Mediterranean fruit. At Hamburg in February 1963, Turkish grapefruit sold at a substantial premium over grapefruit from Cyprus (on an equal-weight basis) and only slightly below prices received for grapefruit from Isreal. In this same market, much the same relationship was indicated in January 1964, when Turkish grapefruit prices nearly equalled prices paid for Israeli grapefruit and were higher than prices paid for Moroccan grapefruit, on an equal-weight basis.

Most of this competition will take place in the future, however, since grapefruit production in Trukey is still small—less than 50,000 boxes.

Association with the EEC

In 1959, the Turkish Government applied for association of Turkey with the European Economic Community (EEC). As a result, an agreement was reached and signed by Turkey in September of 1963, and became effective on December 1, 1964.

"The agreement provides for the progressive introduction of a customs union between Turkey and the Community, with the long-term prospect of the new associate joining as a full member." [6] . . . "It was considered necessary to start with a 'preparatory' stage during which Turkey would strengthen its economic situation with the aid of the Community, without making any specific concession to the Community in return." . . . "This preparatory period will be followed by a 'transition' stage during which the customs union will be gradually built up, this will lead to the 'final' period which will be a definitive customs union."

During the preparatory stage of 5 to 9 years, the EEC will grant Turkey preferential tariff quotas on four items, tobacco, dried grapes, dried figs, and fresh or dried nuts, which represent about 40 persent of Turkish exports to EEC countries. Also, during this period the EEC will give Turkey financial aid.

The transition period may not exceed 12 years, during which time

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[6] **Official Spokesman,** European Economic Community, Rev. Nov. 7, 1963.

Turkey and the EEC will bring about an alignment of economic policies and gradually institute a customs union.

The agreement of association contains these provisions in this regard:

"a) *Customs Union*"

"The union will cover all commodity trade (except the items controlled by the European Coal and Steel Community [Article 26]) and will involve a ban on all customs duties or equivalent charges, quantitative restrictions, and any other measure of equivalent effect between the Member States of the Community and Turkey; Turkey will adopt the Community's common external tariff (Article 10).

"b) *Agriculture*"

"It has been provided that the association arrangement will extend to agriculture and to trade in agricultural products on special terms and conditions duly related to the Community's Common Agricultural Policy" (Article 11).[6]

It is likely that Turkey will become a full EEC member under this agreement, but this will not take place for at least 10 years. This prospect of EEC membership is a competitive aspect of Turkey's citrus industry. However, since so many basic factors are involved should be only a part of the general evaluation of competition.

Processing

In 1963, there were no citrus processing plants in Turkey. However, Turkish Government development plans include processing. A citrus processing plant with a capacity of 80 to 100 tons of fruit per day has been considered. Fruit supplies sufficient for even a modest plant are available only in Antalya and in the Mersin-Adana area.

Turkey produces well-colored table oranges like those characteristic of the Mediterranean and California. In such areas, processing is a salvage operation, using fruit discarded by the fresh fruit industry. It thus follows that processing is feasible only when the fresh fruit industry becomes sufficiently developed to grade fruit into qualities marketable as fresh fruit, and into culls or discards suitable for processing.

It is obvious that any use of fruit for processing in Turkey will return growers a lesser price than fruit used as fresh fruit. This is true in California and in every Mediterranean area processing citrus.

Thus, processing in Turkey is likely to develop only when the domestic market becomes sufficiently discriminating to use large quantities of graded fruit, making culls available for products use.

It is likely to be some time before cull citrus is available in sufficient volume and Turkey would seem to have no advantage as a citrus processor. While a domestic use of juice could probably be developed, very few citrus products are likely to be exported from Turkey in the next 10 years.

Table 7.—ORANGES: Selected auction prices compared by size and origin Hamburg, March 1963, and Rotterdam, January 1964

Size	Rotterdam, January 1, 1964				Hamburg, March 19, 1963			
	Turkey, "Round"	Turkey, Shamouti	Morocco, Hamlin	Morocco, Navel	Turkey, Shamouti	Israel, Shamouti	Spain, Blood Oval	Morocco, Navel
	U.S. dol. 53-56-lb. box	U.S. dol. 53-55-lb. box	U.S. dol. 68-79-lb. box	U.S. dol. 68-79-lb. box	U.S. dol. 53-56-lb. box	U.S. dol. 48-53-lb. box	U.S. dol. 75-84-lb. box	U.S. dol. 70-79-lb. box
56 & 60	2.42-2.62	—	—	—	2.75	3.25	—	—
72 & 75	2.28-2.62	2.90	—	—	3.06	3.94	—	—
80	—	2.62	—	—	3.75	—	—	—
90 & 96	2.42-2.62	—	5.52-5.59	—	—	4.38	—	5.25
100 & 105	2.28-3.04	2.76-3.31	—	—	4.25	4.50	—	—
112 & 113	—	2.90-3.31	—	—	3.06	—	—	—
120	2.28-2.90	—	—	—	—	—	—	—
125 & 126	—	—	5.52-6.08	—	—	4.62	6.38	5.25
138	—	2.42-3.45	—	—	—	—	—	—
144 & 150	2.28-2.69	2.42-3.25	—	5.46-6.08	—	4.69	—	—
168	2.28-2.56	—	—	—	—	—	—	—
176	—	—	5.32-6.01	5.39-6.01	—	—	—	5.75
180	—	2.42-3.18	—	—	—	—	—	—
192	2.28-2.69	—	—	—	—	—	—	—
198 & 200	—	—	—	5.11-5.94	—	4.69	—	6.25
216	—	2.42-3.18	5.32-5.94	5.11-5.39	4.25	4.19	—	—
220	2.07-2.35	—	—	—	—	—	—	—
224	—	—	—	—	—	—	—	5.44
252	—	—	4.97-5.73	—	—	—	—	—
280	2.28	—	—	—	—	—	—	—
288	—	—	—	5.04-5.46	—	—	—	—
324	—	—	3.45-5.52	5.04-5.46	—	—	6.25	—
360	—	—	—	5.46	—	—	5.94	—
392	—	—	3.45-4.83	—	—	—	—	—

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Table 8.—LEMONS: Selected auction prices compared by size and origin Antwerp, November, 1962, and Rotterdam, December, 1962, and January 1964

Size	Antwerp, November 11, 1962			Rotterdam, Dec. 20, 1962					Rotterdam, Jan. 6, 1964	
	Greece	Turkey	Italy	Arizona	California	Turkey	Italy	Arizona	Turkey	Italy
	U.S. dols. 35-40-lb. box	U.S. dols. 35-40-lb. box	U.S. dols. 33-35-lb. carton	U.S. dols. 35-43-lb. carton	U.S. dols. 35-40-lb. carton	U.S. dols. 35-43-lb. box	U.S. dols. 33-35-lb. carton	U.S. dols. 35-43-lb. carton	U.S. dols. 35-40-lb. box	U.S. dols. 35-40-lb. carton
80	—	—	—	—	—	3.31-3.94	3.73	—	—	—
95	—	—	—	5.20	—	—	—	—	—	—
100	—	4.00	—	—	—	3.87-3.94	—	—	2.69-3.66	—
115	—	—	—	6.44	5.60	—	—	4.14-4.35	—	—
120	4.00	5.00	3.10	—	—	4.14	3.73-3.80	—	2.69-3.66	2.90-3.59
140	4.00	4.94	—	7.20	6.20	—	—	5.11-5.25	2.56-4.01	—
150	4.00		3.52	—	—	—	3.45-4.14	—	—	3.04-3.59
160	—	4.22	—	—	—	3.45-4.14	—	—	—	—
165	—	—	—	7.20	5.90	—	—	5.25-5.39	—	—
176	3.94	—	—	—	—	—	—	—	—	—
180	—	—	3.34	—	—	3.11-3.18	—	—	2.56-4.01	2.83-3.59
190	—	4.22	—	—	—	—	—	—	—	—
195	—	—	—	6.60	5.70	—	—	4.49-4.77	—	—
200	—	—	—	—	—	2.76-3.11	—	—	—	—

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Table 9.—LEMONS: Selected auction prices compared by size and origin Hamburg, October, November, December, and March 1963

Size	October 22, 1963			November 18, 1963			December 3, 1963			March 19, 1963	
	Turkey	Chile	Arizona	Turkey	Italy	Arizona	Turkey	Italy	Arizona	Turkey	Italy
	U.S. dols. 33-35-lb. box	U.S. dols. 33-40-lb. box	U.S. dols. 36-43-lb. carton	U.S. dols. 34-36-lb. box	U.S. dols. 33-35-lb. carton	U.S. dols. 35-43-lb. carton	U.S. dols. 33-34-lb. box	U.S. dols. 33-35-lb. carton	U.S. dols. 35-42-lb. carton	U.S. dols. 37-40-lb. box	U.S. dols. 34-36-lb. carton
80 ------	2.56	—	—	2.62-2.75	—	—	2.19-2.44	—	—	2.19-2.56	—
90 ------	—	1.81-2.56	—	—	—	—	—	—	—	—	—
100 ------	2.50-2.81	—	—	2.69-3.12	2.25-2.31	—	2.44-3.12	—	—	2.50-3.31	3.38-3.69
115 ------	—	1.62	3.31-3.50	—	—	3.15-3.31	—	—	3.06-3.38	—	—
120 ------	—	1.50-2.25	—	2.75-3.06	2.31-2.56	—	2.69-3.19	2.25-2.38	—	2.50-3.94	3.06-3.81
140 ------	2.50-3.00	1.50-2.19	3.44-3.69	2.88-3.06	—	3.44-3.62	2.88-3.06	—	3.69-3.81	—	—
150 ------	—	—	—	—	2.38-2.62	—	—	2.31-2.50	—	—	3.44-4.06
160 ------	2.50-2.94	1.50-2.12	—	2.56-2.88	—	—	2.75-3.06	—	—	3.50-3.81	—
165 ------	—	—	3.12-3.38	—	—	3.50-3.56	—	—	3.75-3.81	—	—
176 ------	—	1.19-2.00	—	—	—	—	—	—	—	—	—
180 ------	2.50-2.56	—	—	2.69-2.81	2.19-2.56	—	2.69-3.19	2.62-2.75	—	3.69	3.44-4.00
192 ------	—	—	—	—	—	—	—	—	3.75-3.88		
195 ------	—	1.88	2.69-2.75	2.81	—	3.62-3.69	—	—	3.75-3.88	—	—

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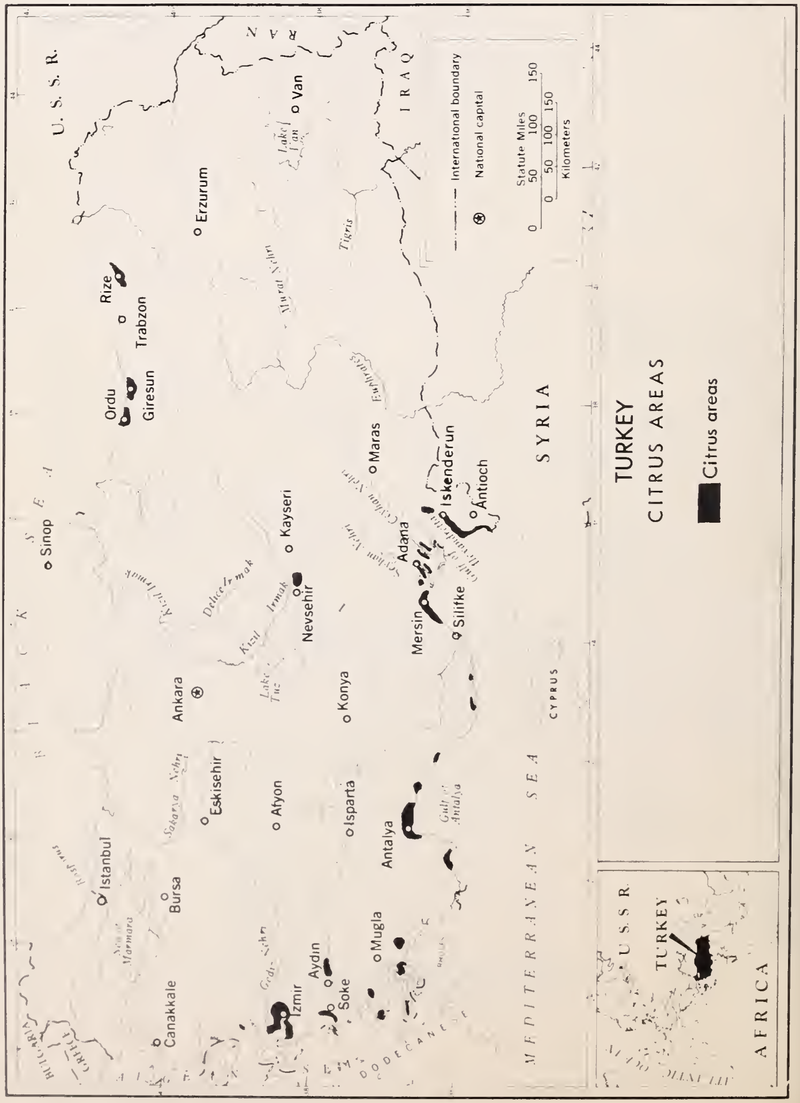

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